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ABSTRACT

Since effective personalization of reading instruction requires considerable knowledge about the function of response variables in learning, and because the value of research summaries lacking substantive supportive data is suspect, the author has provided eight questions for the use of the practitioner as a check list of variables to remove possible difficulties from his program. The questions are stated relevant to some parameters of pupil response involved in personalized and automated reading programs. For each question, illustrative hypothetical research is described to clarify the variables. The results presented are also usually hypothetical or adapted from current research, included to illustrate the kinds of possible conclusions. (AW/MF)

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SOME PARAMETERS OF PUPIL RESPONSE IN LEARNING*

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Many programs of instruction are becoming more highly personalized and automated. This forces some old and new questions upon the teacher, curriculum specialist and researcher. Effective personalization of reading instruction requires considerable reduction of our ignorance with respect to the function of response variables in learning. In this paper questions are stated relevant to some parameters of pupil response involved in personalized and automated reading programs. For each question illustrative hypothetical research is described to clarify the variables. The studies are hypothetical although some of them are based on actual research. The results presented are usually hypothetical or adapted from current research and are included simply to illustrate the kinds of conclusions that are possible. An extensive review of actual research would be desirable, but there is no definitive research on many of the questions posed, for others the studies are reported in journals in so brief a form as to make interpretation impossible and the writer was not able to gather enough of the original materials from the investigator, and for those questions where the data are clear the interaction

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of these variables in practical programs and their long-term effects are not at all clear. I am obviously a skeptic with respect to the value of research summaries based on brief journal articles. It would not be unusual to find a single study determining a point of view and then to find from a more extensive report obtained from the investigators that the study is poorly controlled or that the description of the treatment is inaccurate or that the data analysis is not accurate or appropriate. A few years ago in my review of discovery learning I came across an oft-cited study supporting a discovery learning sequence over a direct exposition sequence only to find in an examination of the actual instructional material that there were significant differences in the number of examples used for pupil practice in the two treatments and that these could over-ride any sequence differences. There were other uncontrolled treatment differences also. Recently in my review of reading research I found that programs cited for having demonstrated the value of a particular practice actually had no substantive data to support the practice; and, when the investigators were asked for data, it was not available. A careful literature review and a significant amount of further research is necessary. But, for the practitioner already involved in the use of a program with some deficiencies, perhaps the most valuable information on "pupil response parameters" is a check list of variables he may consider trying out or adapting to his program to remove the deficiencies. Here then are some pupil response parameters which are relevant to reading programs. If your program has some deficiencies, look over these variables. Ask yourself how they would change what is currently being done. Try out those which seem appropriate. If they work, keep on doing those things. If they do

not, try something else. For a documented review of what the writer sees as the most promising lines of research on reading instruction see Della-Piana, Gabriel,and Endo, George, "Reading Research" in R. M. W. Travers (Ed.) The Second Handbook of Research on Teaching. Rand McNally (in press).

1. Does the frequency of exposure of a word (together with student response) influence growth in perception of the word? Suppose you had two sets of words of the same number of letters and syllables. Set one words are meaningful to the students and set two words are not. Different words are presented for different frequencies (number of trials) like 1, 2, 3, 4, 5, 10, 15 or 25 times. They are also exposed for different durations (low, middle and high exposures ranging from 20 m/sec. to 30 m/sec.). For each flash the student reports the letters he is certain he saw and their position in the word. What happens? The meaningful words are easier to perceive than the others at each exposure duration and for each frequency of exposure. Thus, meaning plays a role in learning. But the meaningful and non-meaningful words both show a rise in percentage of words perceived as a function of trials. Thus, increasing frequency of exposure, together with a required response, produces greater perceptual "growth" for meaningless as well as meaningful stimuli.

2. Does equal practice on each item or different practice frequencies on each item yield more efficient learning of a set of sight words? Suppose you have a list of words. In the variable routine the list is presented several times and then on the next presentation, the word to appear is the one with fewest past presentations and most errors.

In the fixed routine each word is presented the same number of times. What happens? In the variable routine there is a greater variability in rate of getting through the program and greater overall efficiency.

3. Do written answers, self-recitation or reading answers already provided yield differential efficiency for comprehension of material? Suppose a text item was "to preview a movie is to view part of it before it appears as a feature. To premeditate an act is to meditate (or think about it) _____ actually committing the act." This item could be presented with the blank to be filled in by the student in writing, or with the blank to silently be spoken to himself by the student or with the answer "before" written in for the student to read. What happens? With material where the average item difficulty on a post-test is 80% or more persons getting it correct, there is no difference in achievement between groups, but reading is most efficient and writing least efficient. With material which yields average post-test item difficulties of 50% or fewer persons getting it correct, the written filling-in-of-the-blank and silent answering of the questions is more effective than just reading the answer already written in. With material having item difficulties on the post-test between 50% and 80%, the results are ambiguous.

4. Do pure prompted response instructional sequences and prompted plus unprompted sequences yield differential effects in student learning? Suppose that a set of words is taught with picture cues and an audio prompt by a teacher. The student then gives the word under a prompted condition. The alternative condition is one in which the prompts are eliminated (no picture cue or audio prompt) and the student says the word simply looking at the word itself, and, if he is wrong, is corrected.

Call the first condition prompting (P) and the second confirmation (C), and introduce test trials (T) in which the student is tested without cues and with no feedback or correction whether he makes errors or is correct. A study then might look like this:

Condition	Training Sequence of Trials							
Prompting	PPPP	PPPP	PPPP	T	PPPP	PPPP	PPPP	TT
Confirmation	PPPC	PPPC	PPPC	T	PPPC	PPPC	PPPC	TT

What happens? Students learn better under confirmation. Not only that but the most efficient learning takes place when the prompting is optimum at first (all the prompts you need to get a student to make a correct response), minimal later (the smallest amount of prompting necessary to get the response made) and nonexistent as soon as possible.

5. Does pre-instructional set inducing response guidance have facilitating effects on student learning? Suppose you had a set of different kinds of paragraph structures such as: chronological sequence of procedures or events, causal statement followed by a series of effects, a principle followed by one or more examples, an hypothesis followed by evidence which confirms or disconfirms it, etc. You are interested in improving student comprehension of material in these different paragraph structures. Each paragraph structure is taught in two different ways: first by pre-instructional set demonstration prior to instruction and second by instruction alone. The pre-instructional set involves telling the student the kind of thing he will be able to do upon completion of study (e.g., easily understand material in paragraphs with different kinds of structure or organization) and orienting

him to the basic elements of the structure of a given kind of paragraph (e.g., "In a chronological sequence structure there will be a statement of what the sequence is about followed by a list of items in the sequence numbered or ordered in some way so you can tell what the correct order is). The instructional exercise phase is the same for both groups and is a simple demonstration-prompt-release model. Two paragraphs are presented, one of which is a model paragraph marked for structure to guide the student in marking the second one and answering a comprehension question (demonstration), then two more are given with cues in the marked paragraph and the remainder the same as for the demonstration phase (prompting) and finally a new paragraph is presented with no prompts for which the student is to mark the structure and answer comprehension questions. What happens? The pre-instructional set yields more effective student comprehension and more motivation to learn another paragraph structure.

6. Do delays or informative feedback on a response in a learning trial and intertrial interval delays differentially influence letter identification? Suppose you are teaching letter identification. You have a program that is fast paced and gets every pupil responding. Once a letter is accurately recognized (named) and sounded, it is paired with other letters so that the pupil is given practice in discriminating it from other letters in any order of presentation. But the fast pace of the program causes you to wonder a bit. So you set up an experiment with three delays of informative feedback after a pupil response (IF^s of 0, 4, 8 sec.), three lengths of post-IF interval or intertrial interval (post IF^s of 1, 5 and 9 sec.) and two degrees of task complexity based on ease of discriminability of the letters. What happens? There

are more errors for the more difficult letters. Informative feedback (IF) delays had no direct effect on performance nor any interaction effects with other variables. Increase in post-IF interval (intertrial interval) did have an effect. The greater the intertrial interval (from 1 to 9 seconds) the fewer the errors. And the intertrial interval effect was greater for difficult letters than for easy ones.

7. Does degree of mastery pronunciation and meaning of a set of words before going on to the next set yield differential learning effects? Suppose you had a word list graded into five levels of difficulty for ease of learning. At each difficulty level different words are presented instructionally until they reach different levels of correctness mastery including 25%, 50%, 75% and 100% on four consecutive test trials. The instructional technique involved a simple sequence of demonstration (with student imitative response), prompting (reduced cues and student response) and release (student performance with no prompts). If the student performs incorrectly on any stage (including the release or "test" stage), he is corrected. When he reaches the pre-set level of mastery, he goes on. What happens? In general the greater the required mastery the better the post-instructional performance accuracy on pronunciation and meaning. However, for difficult words (levels 4 and 5) 75% and 100% mastery levels yielded clearly the best post-test performance and for easy words (levels 1 and 2) there was no significant difference in post-test performance for the 50%, 75% and 100% mastery groups and the 75% mastery group was completed in a shorter time interval.

8. Do different response latency requirements on a set of words prior to moving to the next set yield differential learning effects? Suppose you had a word list graded into five levels of difficulty for ease of learning. At each difficulty level different words are presented instructionally until they reach different levels of latency mastery (i.e., speed of reading words). The different levels of latency mastery are 2 seconds or less, 2 to 4 seconds, and beyond 4 seconds. For each word mastery at 75% or greater was required. The instructional technique is a simple sequence of demonstration-prompt-release as described in item #7 above. What happens? For the easy words (levels 1 and 2) post-test reading rates and errors were more favorable for the 2 to 4 second latency group and least favorable for the beyond 4 second group. For the difficult words (levels 4 and 5) post-test reading rates and errors were more favorable for the 2 second latency group and the 2 to 4 second latency group and least favorable for the beyond 4 second group.